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<p>(21) International Application Number: PCT/GB93/00728</p> <p>(22) International Filing Date: 7 April 1993 (07.04.93)</p> <p>(30) Priority data: 9207766.8                      7 April 1992 (07.04.92)                      GB</p> <p>(71)(72) Applicant and Inventor: HABERMAN, Mandy, Nicola [GB/GB]; Dove Cottage, 44 Watford Road, Radlett, Herts WD7 8LR (GB).</p> <p>(74) Agent: DEANS, Michael, John, Percy; Lloyd Wise Tregear &amp; Co., Norman House, 105-109 Strand, London WC2R 0AE (GB).</p>		<p>(81) Designated States: JP, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</p> <p><b>Published</b> <i>With international search report.</i> <i>With amended claims and statement.</i></p>
<p>(54) Title: DRINKING VESSEL SUITABLE FOR USE AS A TRAINER CUP OR THE LIKE</p> <div style="text-align: center; margin: 20px 0;"> </div> <p>(57) Abstract</p> <p>A drinking vessel suitable for use as a trainer cup or the like comprises an open-mouthed generally cup-shaped container (2) and a lid (5) for the open mouth of the container. The lid has a mouthpiece (7) associated with it. Valve means (18) are provided to prevent flow of liquid from the interior of the container through the mouthpiece unless a predetermined level of suction is applied to the mouthpiece. Suction alone may be sufficient to withdraw liquid from the trainer cup.</p>		

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DRINKING VESSEL SUITABLE FOR USE  
AS A TRAINER CUP OR THE LIKE

This invention relates to drinking vessels and more particularly to drinking vessels suitable for use as a trainer cup or the like.

Trainer cups (that is a cup or mug provided with a lid having a mouthpiece - usually a spout - associated therewith) are well known and have been designed to bridge the gap between use of a baby's feeding bottle and use of a normal cup or glass by a young child. Such a trainer cup will often be a child's first step in learning to feed itself. As this period in a child's development will usually coincide with the cutting of its first teeth, quite apart from the child's inherent difficulty in handling what is new to it which may lead to the cup inadvertently being knocked over, the irritability characteristic of teething allied with the natural exuberance of young children tends to exacerbate what is frequently a noisy and messy experience.

The existence of the lid may reduce or at least delay the effect of knocking the cup over, but will not deter a child from shaking the cup violently up and down. Neither will the lid delay spillage for very long if the cup is knocked over. Notwithstanding that trainer cups of this kind have been known for a very lengthy period of time, I am unaware of any practical arrangement for overcoming these self-evident problems.

In the somewhat different field of babies feeding bottles, I have myself designed arrangements in which a valve interrupts the flow of fluid from the interior of the bottle through a teat or other mouthpiece (see for example my Patent Specifications Nos: 2 131 301 and

2 169 210). Bottles to my design have achieved some commercial success particularly in the rather specialised field of feeding of babies with sucking problems. Other arrangements proposing valved feeding bottles such as US Patents 4 135 513, 3 704 803 and 4 339 046 and UK Patents 460 274 and 1 253 398 have been proposed in the patent literature but I am not aware that any of these proposals have proved of practical utility. I am not aware of any of them having been marketed. Nevertheless, it is clear that there have been a series of proposals by different workers for the valving of babies feeding bottles. Notwithstanding this, I am not aware of any previous proposal for valving training cups or the like. As will become clear from the detailed description hereinbelow of a presently preferred embodiment of training cup or the like constructed in accordance with my present invention, the present invention enables the production of practical embodiments of trainer cups which neatly and effectively overcome the problems of accidental spillage or of child-generated deliberate attempts at spilling the contents of the trainer cup. Moreover, my practical embodiment achieves this desirable end, never previously achieved, so far as I am aware, in a simple, neat construction which is cheap and simple to manufacture and facilitates easy cleaning. It has no moving parts.

According to a first aspect of my invention, I provide a drinking vessel suitable for use as a trainer cup or the like, comprising: an open-mouthed generally cup-shaped container; and a lid for the open mouth of said cup-shaped container, the lid having a mouthpiece associated therewith; the vessel being provided with valve means adapted to prevent flow of liquid from the interior of the container through the mouthpiece unless a predetermined level of suction is applied to the mouthpiece, the arrangement being such that a user is enabled to draw liquid through the mouthpiece by the sole application of suction thereto.

The valve may be a separate valve member located in use between the container and the lid. Alternatively the valve may be integrally formed with the lid.

Suitably the lid is apertured to allow for the ingress of air to make up for the liquid sucked via the valve through the mouthpiece. To prevent the possibility of liquid issuing through this aperture, that is also suitably provided with a valve, preferably a non-return valve allowing flow of air from the exterior into the container but preventing flow of liquid from the interior of the container outwardly through the aperture.

Conveniently the two valves are provided by a single valve member which may be attached to the lid. The valve member may comprise a single piece of latex, silicone rubber, plastics or other suitable flexible material integrally moulded with two valves, one adapted to underlie the lid in the region of the mouthpiece and the other underlying the aperture. The two valves may comprise dome-shaped regions, the larger underlying the lid in the region of the mouthpiece and being concave towards the interior of the container, and the smaller underlying the aperture and being convex towards the interior. These dome-shaped regions are provided with a simple slit or cross-cut which in effect is self-closing, in each case the slit or cross-cut allowing flow from the concave to the convex side but not in the reverse direction. Other valve formations (e.g., a so-called "duck-bill" or a flap valve) are feasible. The valve member may be held in place between the lid and a valve member support plate.

In an alternative arrangement in which the valve is integrally formed with the lid, the lid itself may be made of a material listed above as a candidate for the separate valve member. The exit valve may comprise several dome-

shaped regions, each with a slit or cross-cut, at the extreme end of the mouthpiece. Alternatively the extreme end of the mouthpiece may be flat and provided with a slit or cross-cut. The inlet valve may comprise a dome-shaped region convex towards the interior of the container with a slit or cross-cut exactly as described above for the separate valve member.

The lid may also have an inner ring spaced from the skirt to provide a channel in which the rim of the container fits to more firmly secure the lid onto the container.

In a further alternative arrangement, the mouthpiece and the valve member are integrally formed and the lid is provided with at least one aperture to allow the mouthpiece to be pushed up through the lid. The mouthpiece/valve member may be of latex, silicone rubber, plastics or other suitable flexible material. The lid may have a second smaller aperture to allow the ingress of air and this aperture is also suitably valved. The exit valve of the mouthpiece may be a slit valve. Alternatively, the second aperture is provided on the mouthpiece. The mouthpiece has a straight-sided portion so that a child sucking on the mouthpiece will not interfere with the ingress of air through this aperture. The aperture may be valved, the valve comprising a dome-shaped region convex towards the interior of the container/mouthpiece having a slit or cross cut.

According to a second and alternative aspect of my invention, I provide a drinking vessel suitable for use as a trainer cup or the like, comprising: an open-mouthed generally cup-shaped container; and a lid for the open-mouth of said cup-shaped container, the lid having an aperture therethrough and a separate mouthpiece formed of

a flexible material, and having a circumextending flange, mounted at said aperture so that a distal portion thereof protrudes outwardly of said lid, the extreme end of said mouthpiece being provided with valve means adapted to prevent flow of liquid from the interior of the container through the mouthpiece unless a predetermined level of suction is applied to the mouthpiece, the arrangement being such that a user is enabled to draw liquid through the mouthpiece by the sole application of suction thereto.

As will be appreciated, not only young children may have a feeding problem with liquids. The term "trainer cup or the like" is accordingly intended herein to encompass cups having the features identified, whether intended for use by a young child or alternatively, for example, by the infirm or senile.

The invention is hereinafter more particularly described by way of example only with reference to the accompanying drawings in which:

Fig. 1 is a sectional view through an embodiment of trainer cup or the like constructed in accordance with the present invention;

Fig. 2 is a plan view of the valve assembly of the trainer cup of Fig. 1;

Fig. 3 is a sectional view taken along the line III-III in Fig. 1;

Fig. 4 is a sectional view through an alternative embodiment of trainer cup or the like also constructed in accordance with the present invention;

Fig. 5 is a plan view of the lid of the trainer cup of Fig. 4;

Fig. 6 is a plan view of the valve assembly of the trainer cup of Fig. 4;

Fig. 7 is a sectional view taken along the line VII-VII in Fig. 6;

Fig. 8 is a plan view of a valve member support plate of the trainer cup of Fig. 4;

Fig. 9 is a sectional view taken along the line IX-IX in Fig. 8;

Fig. 10 is a sectional view through a further alternative embodiment of trainer cup or the like also constructed in accordance with the present invention; and

Fig. 11 is a plan view of the lid of the trainer cup of Fig. 10.

Fig. 12 is a sectional view through a further alternative embodiment of trainer cup constructed in accordance with the present invention;

Fig. 13 is a sectional view through a yet further alternative embodiment of trainer cup constructed in accordance with the present invention;

Fig. 14 is a plan view of the valve and mouthpiece assembly of the trainer cup of Fig. 13; and

Fig. 15 is a sectional view through a further alternative embodiment of trainer cup also constructed in accordance with the present invention.

The trainer cup illustrated in Figs. 1 and 3 is, apart from the addition of the valve assembly 1 described in more detail hereinbelow and illustrated in Fig. 2, generally conventional. It comprises a generally cup-shaped container 2 having a bottom 3 and an upstanding cylindrical wall 4 terminating in an open mouth. Across the open mouth is a lid generally indicated 5. The lid 5 has a mouthpiece 6 associated with it. In this case the mouthpiece comprises a spout 7 integrally formed with the lid and having an opening 8. Figs 4 and 5 show an alternative spout 7' which has a number of small openings 26. Other arrangements are feasible. In particular, a tube or straw could be received in a gland provided in the lid. The lid 5 includes a skirt 9 the internal diameter of which is just slightly less than the external diameter of the container so that the skirt 9 forms a tight fit with the container when the lid is fitted over the open mouth.

Valve assembly 1 is located in use between the container 2 and the lid 5 and, as will be explained below, serves to prevent flow of liquid from the interior of the container 2 through the spout 7 of mouthpiece 6 unless suction is applied at the opening 8 to the spout. As can best be seen from Figs. 1 and 2, the valve assembly comprises a generally disc-shaped member 10 which is suitably moulded from latex, silicone rubber, or other suitable plastics material. Member 10 is fitted to the lid 5 by means of a central boss 11 which is received in a corresponding opening 12 in the centre of the lid. In an alternative

arrangement, the boss may be integrally formed with the lid, and the valve assembly 1 is provided with a central opening for receiving the boss on the lid. Although member 10 may be permanently fitted to the lid, for ease in cleaning, the member is suitably detachable from the lid by removal of boss 11 from opening 12. Around its periphery 13 the valve assembly disc member 10 is provided with an integral lip or thickened region in the form of a ring. This not only provides for strength at the edge but provides a region which, since the disc is given a diameter greater than the interior diameter of the lid results in compression at the edge so that the valve assembly disc member provides a sealing effect around its periphery in effect between the lid and the container serving to additionally reduce the likelihood of spillage by leakage between the container and its lid. The disc 10 is provided with two dome-shaped regions 14 and 15. The larger of these is positioned to underlie the mouthpiece 6 and to be concave towards the interior of the container in use. The smaller of the two dome-shaped regions has the opposite configuration and is provided for a purpose to be explained below. Each dome-shaped region is provided with a slit or cross-cut partially thereacross.

Lid 2 is apertured at 16 to provide for ingress of air into the container as liquid is sucked out through the spout 7 of mouthpiece 6. The smaller dome 15 underlies aperture 16 in use and allows flow of air from the exterior through the slit 17 and into the interior of the container, but only when the pressure within the container is sub-atmospheric through suction applied to mouthpiece 6. The slit is in effect a self-closing non-return valve so that liquid within the container is prevented from exit via the slit and aperture 16. Slit 18 in the larger dome 14 is also self-closing. In other words, unless suction is applied to the opening 8 of spout 7, liquid within the container will

not pass through the slit. Consequently, if a container with liquid therewithin is simply shaken up and down or is accidentally spilt, firstly, fluid cannot pass through slit 17 and aperture 16 and secondly, cannot pass through slit 18 into the mouthpiece. The sealing at the periphery tends additionally to prevent the possibility of leakage between the lid and the container.

In alternative arrangements the disc 10 is provide with different shapes of valve, e.g., the dome-shaped regions 14 and 15 may be replaced by duck-bill valves or by a simple flap valve. These valve assemblies should all operate in a manner similar to the arrangement previously described.

The trainer cup illustrated in Fig. 4 is similar to that illustrated in Fig. 1, comprising cup-shaped container 2', valve assembly 1' and lid 5'. The valve assembly 1' is shown with the thickened lip 19 forming a sealing ring. Additionally, the trainer cup is provided with a valve member support plate 20, which underlies the valve assembly 1'. It is provided with openings 21 and 22 corresponding to the dome-shaped regions 14' and 15' of the valve assembly 1'. The plate 20 has a central boss 23 which passes through an opening 24 of the valve assembly 1' and an opening 25 of the lid 5'.

Valve assembly 1' and lid 5' are assembled as before. The plate 20 holds valve assembly 1' against the lid and is attached to the lid by means of boss 23 being fitted through openings 24 and 25. The valves are unimpaired by retainer 20, opening 21 underlying the larger dome-shaped region 14' and opening 22 underlying the smaller dome-shaped region 15'.

Figure 10 illustrates an alternative arrangement in which the valve assembly is integrally formed with the lid. A cup-shaped container 30 has a lid 31. Lid 31 is provided with a mouthpiece 32 in the form of a spout 33. The spout is integrally formed with a number of dome-shaped regions 34 concave toward the interior of the container in use, and each provided with a slit or cross-cut 35. In an alternative arrangement the extreme end of the mouthpiece may be flat and provided with a slit or cross-cut. The lid is integrally formed with a further dome-shaped region 36, of the opposite configuration to dome-shaped region 34, and also provided with a slit or cross-cut 37. In use lip pressure and suction applied at the spout 33 opens the slits 35 allowing flow of liquid out of the container. Slit 37 also opens allowing ingress of air in to the container. The slits again have the effect of being self-closing non-return valves. The lid 31 with integrally formed valve assembly may be moulded from similar materials to those used for moulding the valve assembly 1.

Figure 12 illustrates a similar arrangement to that of Figure 10 but with the additional feature of a ring 38 inwards of the skirt 39 of the lid 31'. This ring 38 together with the skirt 39 forms a groove 40 into which the rim 41 of container 30' fits, to provide a tighter seal.

In the alternative arrangement of Fig. 13, container 60 is provided with lid 61 and a combined mouthpiece and valve member 42. Lid 61 is provided with two apertures 43 and 44. Aperture 43 allows for the ingress of air while aperture 44 is large enough to allow the mouthpiece 45 to fit within this aperture. A slit valve is provided on the mouthpiece. Valve means 46 comprising a dome-shaped region provided with a slit or cross-cut 47 underlies the aperture 43. The rim 48 of the member 42 is thickened to provide a good seal.

In a further alternative arrangement illustrated schematically in Figure 15, lid 49 is also provided with aperture 50, large enough to accommodate mouthpiece 51. The mouthpiece 51 in this case is formed from flexible material, for example, latex or silicone rubber and has a flange 52, and so has a configuration corresponding to that of a conventional feeding bottle teat. Flange 52 may be press-fitted over disc 53 of lid 49 prior to attaching the lid 49 to container 54. Mouthpiece 51 comprises a spout portion 55 and a straight sided section 56. Straight sided section 56 is provided with valve means 57 in the form of a dome-shaped region convex towards the container and provided with a slit to allow for the ingress of air into the container 54 as fluid is sucked out through spout region 55. Spout 55 is provided with a slit valve 58 which controls flow from the trainer cup. The application of suction alone to the mouthpiece is sufficient to open the otherwise closed slit valve 58 to allow liquid from the trainer cup. In the absence of suction liquid is effectively prevented from leaving the cup. The teat-configuration mouthpiece of this embodiment may be readily replaceable.

I have found in practice that although practical embodiments of a trainer cup according to my design are very effective in preventing deliberate or accidental spillage in this fashion, they have no significant effect in reducing the ability of a child to drink from the cup by sucking on the spout. I have also found that cups to my design can readily be employed by the relatively infirm or by the senile. With this view, the container is provided with a pair of opposed handles 59 which can readily be grasped by a young child or by an arthritic aged person.

As compared with conventional trainer cups, the only additional expense in cups to my design is the additional cost of the valve assembly 1, and optionally the valve assembly support plate, or alternatively the substitution of the one-piece lid and valve assembly of Fig. 11 for a conventional trainer cup lid. As the valve assembly or one-piece lid and valve assembly would be simple one-piece mouldings, the additional cost is negligible. Assembly is simple since, e.g. the boss 11 in the Fig. 1 embodiment simply needs to be pushed into opening 12. Cups to my design are accordingly cheap and simple to manufacture and are adapted for ready use by ordinary members of the public or, for example, in a children's home or an old people's home, being easy to clean as the parts are readily separable.

CLAIMS

1. A drinking vessel suitable for use as a trainer cup or the like, comprising: an open-mouthed generally cup-shaped container; and a lid for the open mouth of said cup-shaped container, the lid having a mouthpiece associated therewith; the vessel being provided with valve means adapted to prevent flow of liquid from the interior of the container through the mouthpiece unless a predetermined level of suction is applied to the mouthpiece, the arrangement being such that a user is enabled to draw liquid through the mouthpiece by the sole application of suction thereto.
2. A drinking vessel according to Claim 1, wherein said valve means is a separate valve member located in use between the cup-shaped container and the lid.
3. A drinking vessel according to Claim 1, wherein said valve means is integral with the lid.
4. A drinking vessel according to Claims 1 or 3, wherein the valve means is at the extreme end of the mouthpiece.
5. A drinking vessel according to any preceding claim, wherein the lid is provided with an aperture to allow for the ingress of air.
6. A drinking vessel according to Claim 5, wherein said vessel is provided with additional valve means to prevent flow of liquid from the interior of the cup-shaped container through said aperture.
7. A drinking vessel according to both Claim 2 and Claim 6, wherein both said valve means are provided on the same said valve member located in use between the lid and the cup-shaped container.

8. A drinking vessel according to Claim 2 or any claim appendant thereto, wherein said valve means comprises a dome-shaped region concave towards the interior of the cup-shaped container and underlying the mouthpiece, the dome-shaped region having a slit therein.

9. A drinking vessel according to Claim 7, wherein said additional valve means underlies said aperture and comprises a dome-shaped region convex towards the interior of the container and having a slit to allow flow from the concave to the convex side but not in the opposite direction.

10. A drinking vessel according to Claim 2 or any claim appendant thereto, further comprising a support plate to hold the valve member in place beneath the lid.

11. A drinking vessel according to Claim 4, wherein said valve means comprises a simple slit which remains closed until suction is applied to the mouthpiece.

12. A drinking vessel according to Claim 4, wherein said valve means comprises a series of dome-shaped regions each having a slit therein and being concave towards the interior of the vessel.

13. A drinking vessel according to Claim 1, wherein said lid has an aperture large enough to accommodate said mouthpiece; said mouthpiece has a flange and said lid has a disc, in operation to allow said flange of said mouthpiece to be press-fitted over said disc and to be held in place by said disc; and said valve means comprises a slit at the extreme end of said mouthpiece.

14. A drinking vessel according to Claim 13, wherein said mouthpiece has a straight sided portion and a spout

portion, said straight sided portion having a dome-shaped region convex towards the interior of the container having a slit, effective to allow the ingress of air into the container as fluid is sucked out through the spout region of said mouthpiece.

15. A drinking vessel suitable for use as a trainer cup or the like, comprising: an open-mouthed generally cup-shaped container; and a lid for the open-mouth of said cup-shaped container, the lid having an aperture therethrough and a separate mouthpiece formed of a flexible material, and having a circumextending flange, mounted at said aperture so that a distal portion thereof protrudes outwardly of said lid, the extreme end of said mouthpiece being provided with valve means adapted to prevent flow of liquid from the interior of the container through the mouthpiece unless a predetermined level of suction is applied to the mouthpiece, the arrangement being such that a user is enabled to draw liquid through the mouthpiece by the sole application of suction thereto.

## AMENDED CLAIMS

[received by the International Bureau on 6 September 1993 (06.09.93); original claims 1,8,11-13 and 15 amended; other claims unchanged (3 pages)]

1. A drinking vessel suitable for use as a trainer cup or the like, comprising: an open-mouthed generally cup-shaped container; and a lid for the open mouth of said cup-shaped container, the lid having a mouthpiece associated therewith; the vessel being provided with valve means comprising a self-closing slit valve adapted to prevent flow of liquid from the interior of the container through the mouthpiece unless a predetermined level of suction is applied to the mouthpiece, and to enable a user to draw liquid through the mouthpiece by the sole application of suction thereto.

2. A drinking vessel according to Claim 1, wherein said valve means is a separate valve member located in use between the cup-shaped container and the lid.

3. A drinking vessel according to Claim 1, wherein said valve means is integral with the lid.

4. A drinking vessel according to Claims 1 or 3, wherein the valve means is at the extreme end of the mouthpiece.

5. A drinking vessel according to any preceding claim, wherein the lid is provided with an aperture to allow for the ingress of air.

6. A drinking vessel according to Claim 5, wherein said vessel is provided with additional valve means to prevent flow of liquid from the interior of the cup-shaped container through said aperture.

7. A drinking vessel according to both Claim 2 and Claim 6, wherein both said valve means are provided on the same said valve member located in use between the lid and the cup-shaped container.

8. A drinking vessel according to Claim 2 or any claim appendant thereto, wherein said valve means comprises a dome-shaped region concave towards the interior of the cup-shaped container and underlying the mouthpiece, the dome-shaped region having a slit therein defining the self-closing slit valve.

9. A drinking vessel according to Claim 7, wherein said additional valve means underlies said aperture and comprises a dome-shaped region convex towards the interior of the container and having a slit to allow flow from the concave to the convex side but not in the opposite direction.

10. A drinking vessel according to Claim 2 or any claim appendant thereto, further comprising a support plate to hold the valve member in place beneath the lid.

11. A drinking vessel according to Claim 4, wherein said valve means comprises a simple slit at the extreme end of the mouthpiece defining said slit valve, which slit remains closed until suction is applied to the mouthpiece.

12. A drinking vessel according to Claim 4, wherein said valve means comprises a series of dome-shaped regions each having a slit therein and being concave towards the interior of the vessel, each such slit defining a said slit valve.

13. A drinking vessel according to Claim 1, wherein said lid has an aperture large enough to accommodate said mouthpiece; said mouthpiece has a flange and said lid has a disc, in operation to allow said flange of said mouthpiece to be press-fitted over said disc and to be held in place by said disc; and said slit valve is formed as a slit at the extreme end of said mouthpiece.

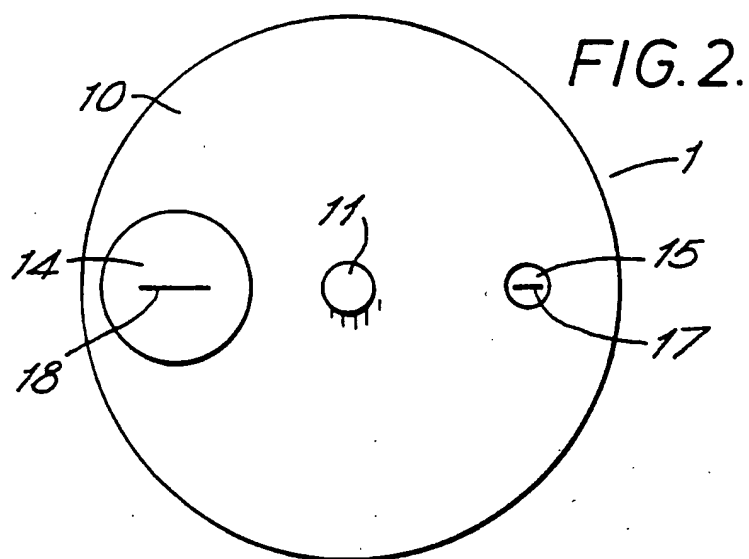
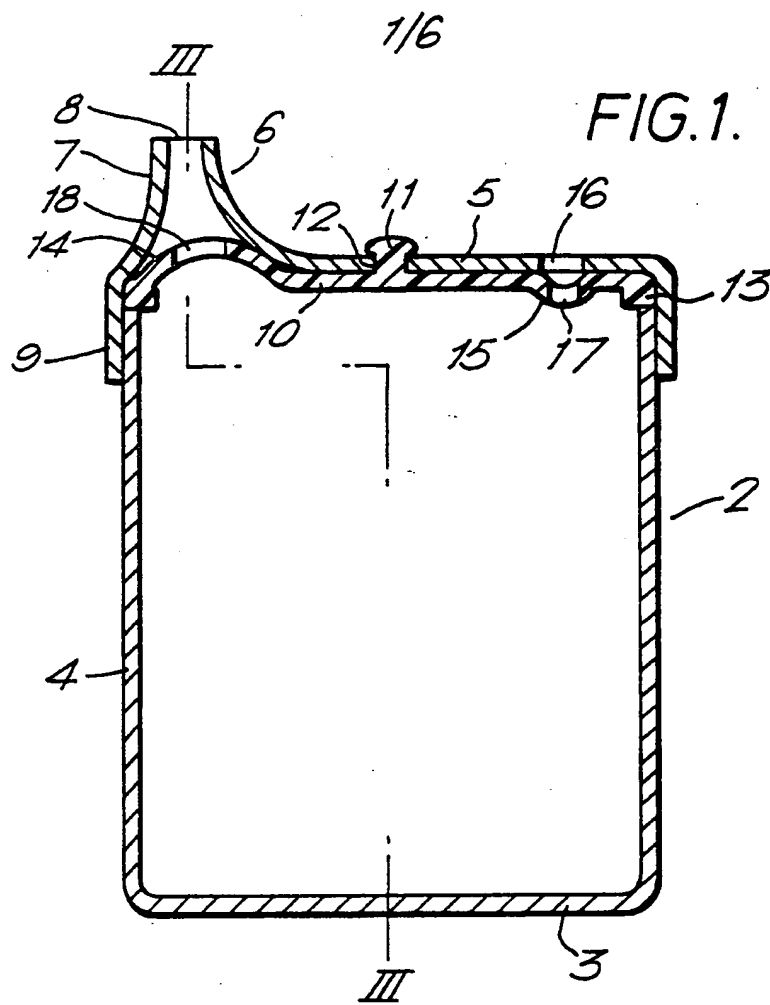
14. A drinking vessel according to Claim 13, wherein said mouthpiece has a straight sided portion and a spout portion, said straight sided portion having a dome-shaped region convex towards the interior of the container having a slit, effective to allow the ingress of air into the container as fluid is sucked out through the spout region of said mouthpiece.

15. A drinking vessel suitable for use as a trainer cup or the like, comprising: an open-mouthed generally cup-shaped container; and a lid for the open-mouth of said cup-shaped container, the lid having an aperture therethrough and a separate mouthpiece formed of a flexible material, and having a circumextending flange, mounted at said aperture so that a distal portion thereof protrudes outwardly of said lid, the extreme end of said mouthpiece being provided with valve means comprising a self-closing slit valve adapted to prevent flow of liquid from the interior of the container through the mouthpiece unless a predetermined level of suction is applied to the mouthpiece, and to enable a user to draw liquid through the mouthpiece by the sole application of suction thereto.

**STATEMENT UNDER ARTICLE 19**

The application as filed included two independent Claims 1 and 15. These have been amended under Article 19 to make it clear that the valve means comprises a self-closing slit valve. The amendments made at this time to Claims 8, 11, 12 and 13 are consequential upon the amendment to Claim 1.

The amended claims are clearly neither lacking in novelty or inventiveness having regard to any of the cited documents. A valve of this kind is to be found in the nipple or teat described and illustrated in applicant's own GB-A-2 169 210 which is concerned solely with a baby's feeding bottle. There is not the slightest suggestion in that specification of applying the same or similar technology to a trainer cup. The purpose of the arrangement of GB-A-2 169 210 was to enable a mother or other responsible adult to help babies with poor sucking ability to feed from a conventional baby's feeding bottle by enabling the mother to apply pressure to open the slit valve.



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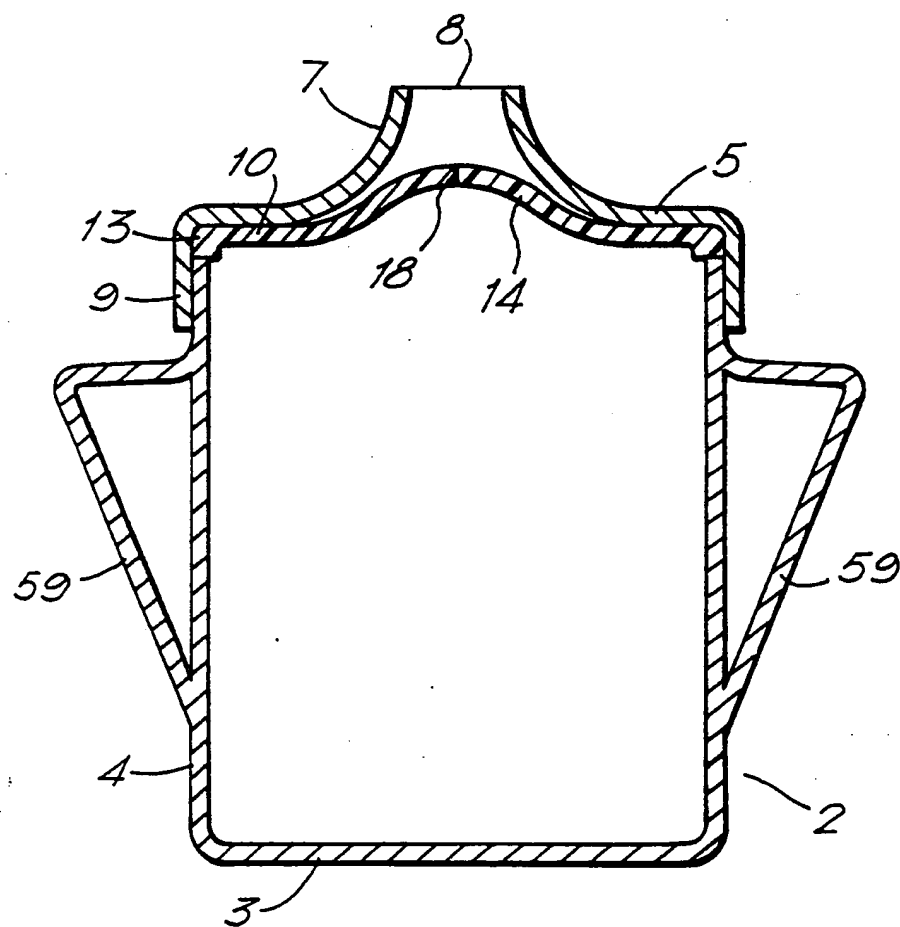


FIG. 3.

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FIG. 4.

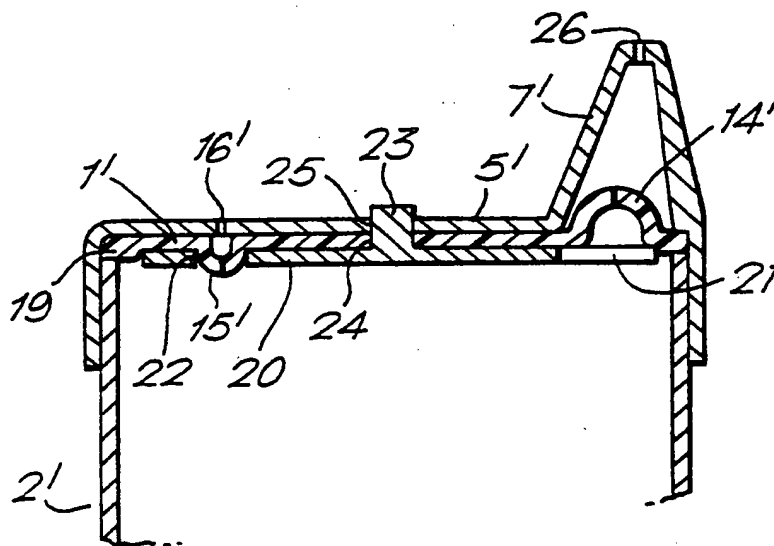
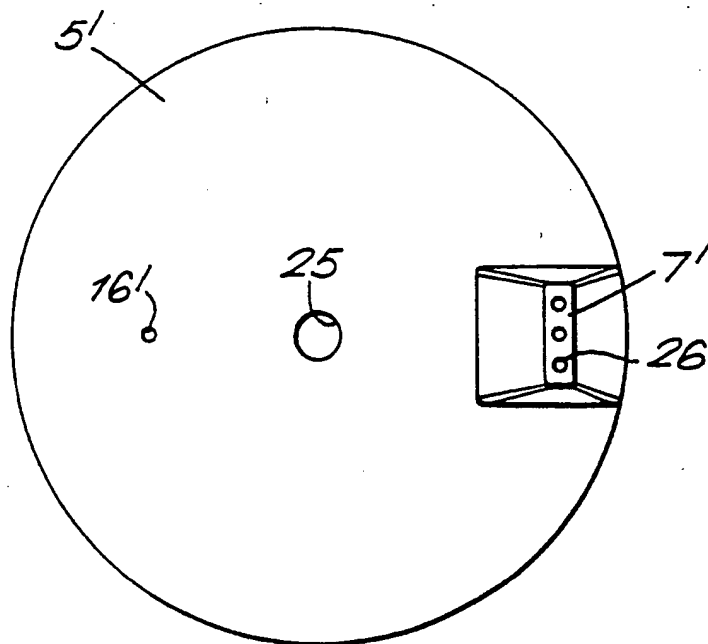
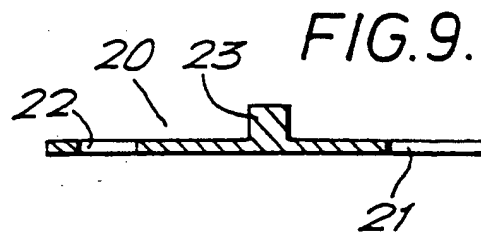
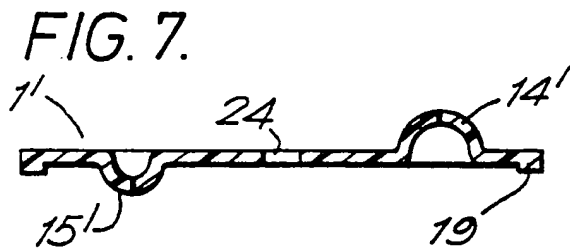
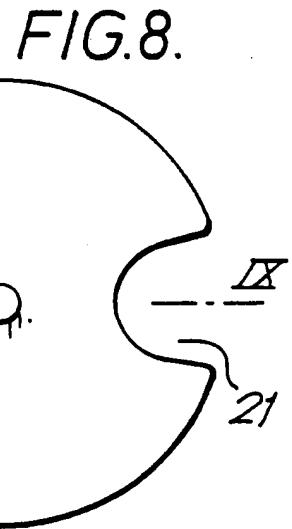
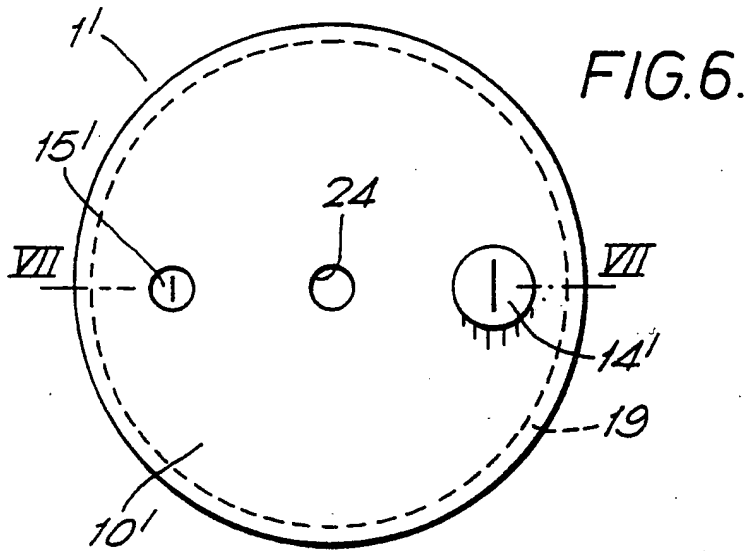
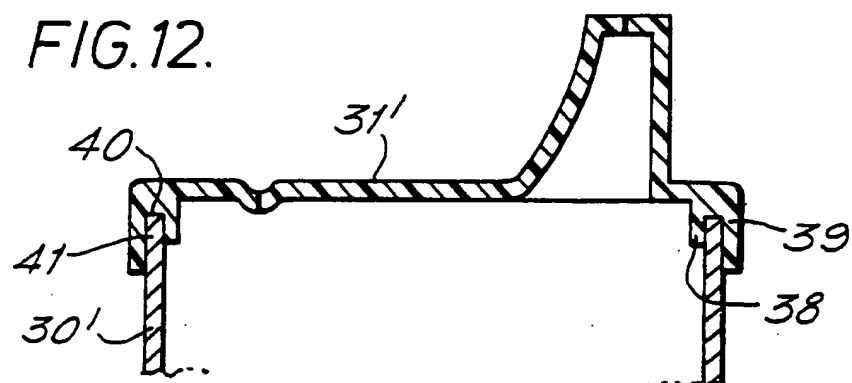
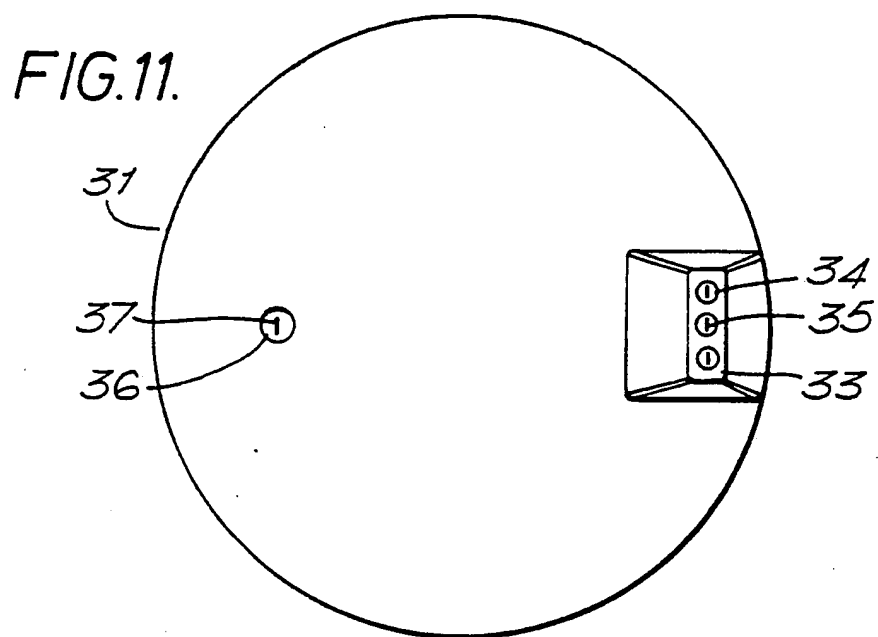
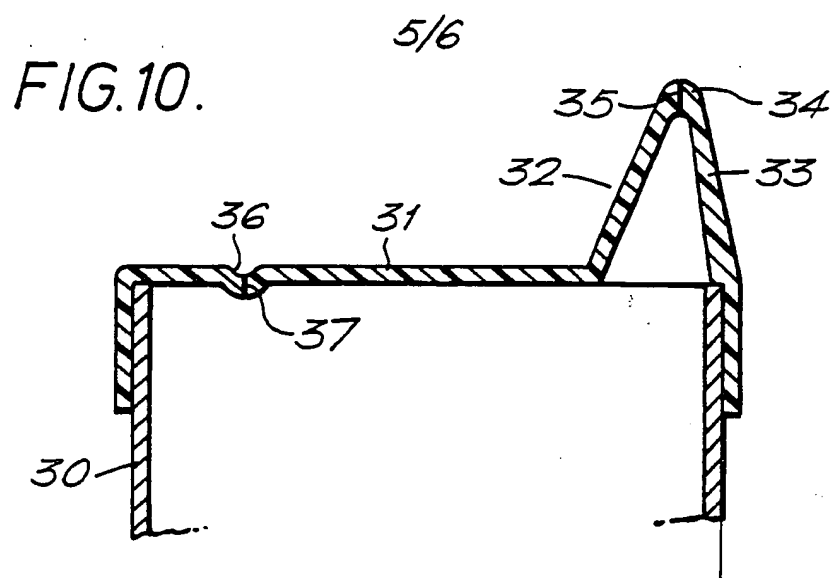


FIG. 5.



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FIG.13.

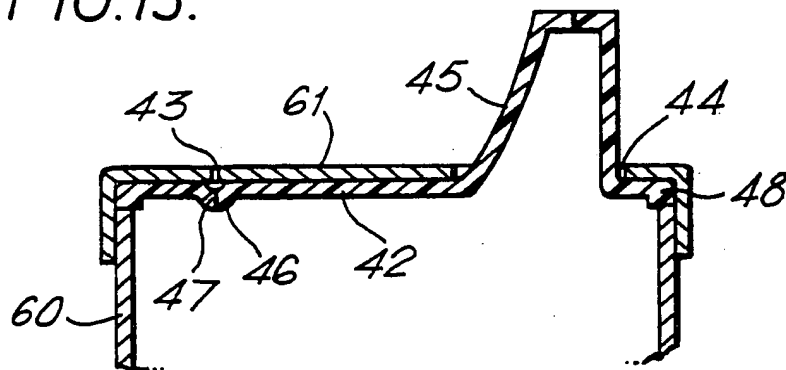


FIG.14.

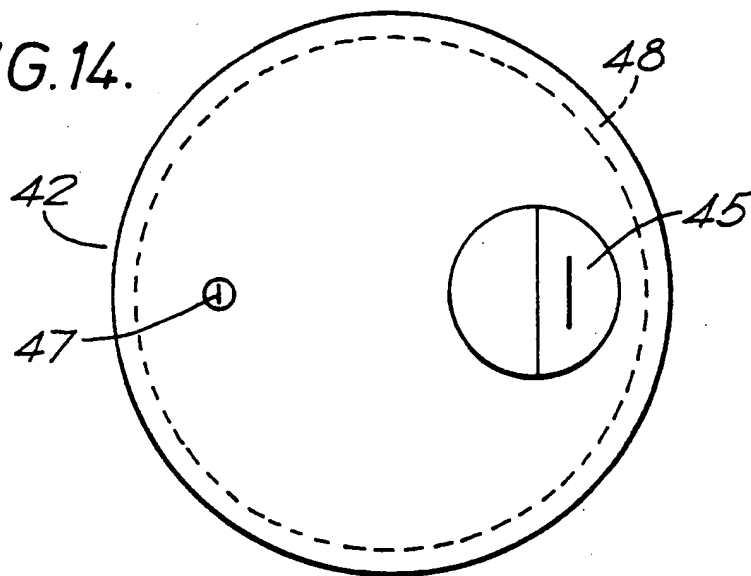
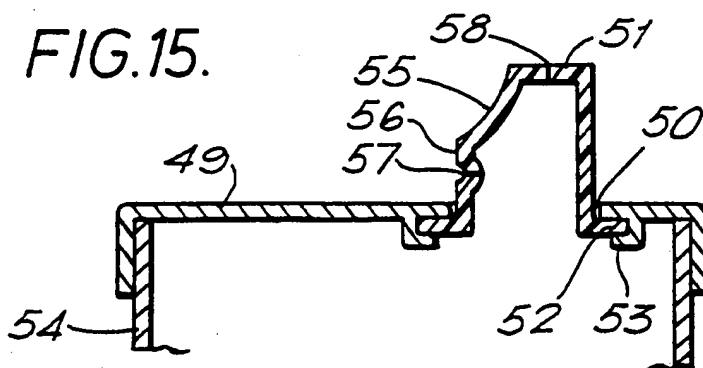


FIG.15.



# INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 93/00728

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>6</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC Int.C1. 5 A61J9/04;                      A47G19/22		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
Int.C1. 5	A61J ;              A47G	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>8</sup>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup></b>		
Category <sup>10</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
X	EP,A,0 326 743 (COY) 9 August 1989	1,3-6,11
Y	see column 4, line 37 - column 5, line 3; figures	2,8,13, 15
X	US,A,5 079 013 (BELANGER) 7 January 1992 see figures 1,2	1,3,5,6
Y	GB,A,2 169 210 (HABERMAN) 9 July 1986 cited in the application see figures 9,10	2,8
Y	DE,A,3 118 976 (SCHWARZ) 2 December 1982 see figures	13,15
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><sup>10</sup> Special categories of cited documents :</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&amp;" document member of the same patent family</p> </div> </div>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report
17 JUNE 1993		29. 06. 93
International Searching Authority		Signature of Authorized Officer
EUROPEAN PATENT OFFICE		GODOT T.

**ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO.**

GB 9300728  
SA 72624

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.  
The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

17/06/93

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US-A-5079013	07-01-92	None	
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